REA CABLE AND WIRE CONFERENCE

Minutes of Meeting

A symposium on wire and cable was held in Washington, D. C., on June 20, 1956, and was attended by the following personnel:

Name	Company
A. C. Connell	Anaconda Wire and Cable Company
Joseph C. Sokolowski	" " " " "
Bruce Van Wagner	" " " " "
William D. Johnson	Ansonia Wire and Cable Company
E. R. Kerwin	" " " " "
V. Siegfried	" " " " "
I. Kolodny	General Cable Corporation
W. M. Driggs	General Telephone Corporation (U.S.I.T.A.)
W. J. Suklich	Okonite Company
R. G. Gleeson	Plastic Wire and Cable Corporation
V. McBride	" " " " "
D. E. Cheney	Reliable Electric Company
R. E. Kiernan	Rex Corporation
H. E. Prouty	" "
Arnold Sher	John A. Roebling's Sons Corporation
John A. Pranke	Rome Cable Corporation
O. N. Mitiopoulos	Simplex Wire and Cable Company
E. S. Read, Jr.	" " " " "
James L. Robb	Superior Cable Corporation
E. G. Sturdevant	United States Rubber Company
R. H. Dudley	Whitney Blake Company
J. C. Wolff	" " "
C. R. Ballard	Rural Electrification Administration
A. F. Felter	" " "
A. L. Richey	" " "
W. T. Smith	" " "

Mr. Smith opened the meeting and introduced Mr. W. M. Driggs of U.S.I.T.A. to the representatives. He then gave a brief discussion on the need for standardization of color coding for multi-pair distribution wire and polyethylene insulated cables, as well as, the need of standardizing on certain sizes and gauges of distribution wire which best lend themselves to the construction of rural type plants.

Mr. Richey discussed with the representatives a cost study which was prepared by Mr. R. S. Bailey, consultant to REA. This study is intended to reflect the initial in place cost of the various facilities to give proper prospective to economic considerations between open wire, insulated open wire, parallel insulated wire and multi-pair distribution wire. There are, however, transmission limits which would preclude the use of parallel insulated wire and multi-pair distribution wire in the longer circuits

which would be encountered in rural areas. However, a substantial portion of the subscribers fall within transmission limitations of distribution wire, therefore we would expect a continuing increase in the use of multi-pair distribution wire.

Mr. Smith discussed with the representatives the desirability of standardizing on 2, 4 and 6 pair multi-pair distribution wire.

Mr. Driggs informed the representatives that the Gary organization had conducted a study of needs of their systems and had selected 2, 4 and 6 pair 19 gauge distribution wire as their standards. This standardization reflected an evaluation of some 30 operating companies.

It was the consensus of the representatives that the proposed 2, 4 and 6 pair 19 gauge distribution wire should become the standard and REA agreed to prepare the necessary specifications to cover these sizes with the intent that these sizes would be placed on our "List of Materials Acceptable for Use on Telephone Systems of REA Borrowers" for those companies submitting data of an acceptable nature.

Mr. Smith discussed with the representatives the economics involved in the use of 11 pair 22 gauge versus 11 pair 19 gauge and 16 pair 22 gauge versus 16 pair 19 gauge. There appears to be a substantial cost differential in the gauges in the order of $400.00 per mile. This cost differential is so substantial that it cannot be overlooked in extending standards for these sizes. With regard to past use in the field, Mr. Smith informed the representatives that during 1955 approximately 30% of our construction involved in aerial cable plant was in sizes of 11 and 16 pair. In the 11 pair size 86% was 22 gauge, in the 16 pair size 65% was 22 gauge, 26% was 24 gauge, and 9% was 19 gauge. REA has concluded from this study that where transmission is not controlling, the 22 gauge multi-pair distribution wire in the sizes of 11 and 16 pair is considered to be the best choice.

Mr. Driggs informed the representatives that the apparent difference in cost between 6 pair 19 gauge and 11 pair 19 gauge in the order of some $800.00 per mile would indicate that possibly an initial construction of 6 pair being reinforced with an additional 6 pair at some later date, would quite often be the best economic choice.

Mr. Kolodny informed the representatives that they now have in stock some 16 pair 22 gauge multi-pair distribution wire. General Cable Corporation has reduced the wall thickness of polyethylene from .020 inch specified for the 6 pair 19 gauge to .015 inch with an outer jacket of .010 inch of polyvinyl chloride resulting in a mutual capacitance similar to that obtained in the 19 gauge multi-pair distribution wire.

Mr. McBride discussed the question of length of cable lay, ease of getting to pairs and core popping with the representatives. This discussion was primarily directed toward the 11 and 16 pair distribution wire.

Mr. McBride suggested that it would appear desirable to lengthen the maximum permissible cable lay of 10 inches as outlined in REA Specification PE-15 to possibly 15 inches. This would facilitate bringing out pairs for drop connections. Mr. Kolodny stated that the problem of "core popping" was in the manufacture of the wire and that they were now able to manufacture a 16 pair wire with a cabling lay of some 14 inches.

Mr. Richey discussed with the representatives the question of utilization of grade C galvanizing in lieu of grade A galvanizing for the steel support wire. Mr. Robb informed the representatives that the availability of grade C galvanizing may be a controlling factor. It is Mr. Robb's understanding that only a limited amount of grade C is available and to specify grade C wire would possibly curtail the production of the wire. It was concluded that possibly a better approach might be to change construction practices in highly corrosive areas. REA agreed to make a study of other methods of protecting support wire and inform the representatives at a later date.

Mr. Richey presented to the representatives a proposed color code for multi-pair distribution wire for sizes 2 through 16 pair and a color code for polyethylene insulated conductors in jacketed cables of 1 through 51 pair. He stated that there are many different color codes presently being offered by the manufacturers of multi-pair distribution wire and it appears extremely desirable to have a standard color code to offer to their buyers. After some discussion and several suggested amendments, it was concluded that for the manufacture of multi-pair distribution wire, we would use the following codes:

Color Code for Multi-Pair Distribution Wire

2 Pair			11 Pair			16 Pair		
1	Blue	Black	1	Blue	Black	1	Blue	Black
2	Red	"	2	Red	"	2	Red	"
			3	Green	"	3	Green	"
4 Pair			4	Brown	"	4	Brown	"
			5	Slate	"	5	Slate	"
1	Blue	Black	6	Blue	Yellow	6	Blue	Yellow
2	Red	"	7	Red	"	7	Red	"
3	Green	"	8	Green	"	8	Green	"
4	Brown	"	9	Brown	"	9	Brown	"
			10	Slate	"	10	Slate	"
6 Pair			11	Yellow	Black	11	Blue	White
						12	Red	"
1	Blue	Black				13	Green	"
2	Red	"				14	Brown	"
3	Green	"				15	Slate	"
4	Brown	"				16	Yellow	Black
5	Slate	"						
6	Yellow	"						

Mr. Richey discussed with the representatives a suggested color code for plastic insulated, plastic jacketed cables. This code is presently being used by the Bell System. REA does not propose at this time to include a color code in its specification for plastic insulated, plastic sheathed cables. However, where borrowers so desire to purchase color coded cables REA would offer no objections in cables of 22, 24, and 26 gauge. We recommend that the Bell System color code be utilized in these instances.

Mr. Richey discussed with the representatives the question of capacitance unbalances in plastic insulated cables. REA has encountered difficulty with some of the Bell operating companies with respect to a requirement for capacitance deviations in toll connecting cables. Discussions between REA and some of the Bell operating companies indicate that they would expect a maximum of 3% rms deviation from the average mutual capacitance as a tolerable limit. REA believes that the manufacturers of plastic insulated cables can, by proper design and manufacture, obtain a very uniform mutual capacitance in plastic cables which would certainly be below the 3%. REA does not, as of this time, have enough data to evaluate which would permit a limit to be specified. REA intends to insert a value for comment by the manufacturers at the time a revised draft specification is prepared.

REA officials passed out to the representatives a paper entitled "Field Trial Data for One Pair Parallel Distribution Wire" and gave a brief discussion of possible applications of this wire. It is intended by REA that this suffice for design and construction of this wire during the field trial period. Ultimately REA would expect to obtain sufficient data to permit evaluation of this wire.

Mr. Smith discussed with the representatives the subject of insulated line wire. This discussion outlined the benefits available through the use of this wire. REA is presently evaluating fittings for supports and deadends which would permit the construction of this wire without the use of conventional hardware; i.e., insulators, pins and crossarms, etc. REA hopes to have installations of this conductor in the field and make observations and tests to determine its capabilities and limitations.

Mr. Smith discussed with the representatives a new conception of closing splices in plastic insulated cables. In this approach it would be necessary to insulate and waterproof each of the individual conductor joints inside the cable. This would permit some relaxation of the requirements for a moisture-proof splice closure. REA proposed that terminals of the type of Cook Electric PLX, Western Electric 49A and Reliable Electric "in-and-out" type be approved as equal alternates to the tape closure presently outlined in REA splicing standards. The representatives offered no objections to the use of these types of closures and terminals. It was concluded that REA would prepare a draft splicing standard incorporating the use of these alternates and submit the draft to the manufacturers for their comments in the near future.

Mr. Smith discussed with the manufacturers the question of standardization of sheath material utilizing only polyethylene compound. There are presently three manufacturers, Plastoid Corporation, Ansonia Wire and Cable Company and the Okonite Company, that use the vinyl sheath material for cables. The representatives of the Ansonia and Okonite Companies agreed to approach their management with this proposal and would inform REA of their position with respect to the use of polyethylene sheath material at an early date.

Mr. Pranke broached the subject of amending the PE-14 specification as related to tests for polyethylene sheath material to include a test for environmental stress cracking. Various other representatives made comments in this regard and it appears that such tests may be practical. Mr. Richey stated that he would further investigate the possibility of a test for environmental stress cracking and would inform the representatives of his findings.

The question of defective pairs was raised by Mr. Connell in which he pointed out that defective pairs as defined in REA Specification PE-15 covered only opens and shorts. He asked why resistance unbalances and capacitance unbalances exceeding the specified limit should not also be considered defective pairs. REA officials stated that PE-15 was in the state of being extended appreciably and that the part dealing with defective pairs would receive major attention.